

Amendments to the Claims

1 Claim 1 (currently amended): A computer program product for sending Transmission Control  
2 Protocol (TCP) messages through HyperText Transfer Protocol (HTTP) systems, the computer  
3 program product embodied on one or more computer-readable media and comprising:

4 computer-readable program code means for establishing a send channel from a first  
5 component on a client side of a network connection, through one or more HTTP-based systems,  
6 to a second component on a remote side of the network connection;

7 computer-readable program code means for establishing a receive channel from the first  
8 component, through the one or more HTTP-based systems, to the second component, wherein  
9 the receive channel is distinct from the send channel;

10 computer-readable program code means for establishing a first TCP connection from a  
11 client on the client side to the first component;

12 computer-readable program code means for establishing a second TCP connection from  
13 the second component to a target server on the remote side;

14 computer-readable program code means for transmitting client-initiated TCP requests  
15 from the client to the target server by packaging the client-initiated TCP requests into HTTP  
16 messages which are transmitted on the send channel; and

17 computer-readable program code means for transmitting server-initiated TCP requests  
18 from the target server to the client by packaging the server-initiated TCP requests into HTTP  
19 messages which are transmitted on the receive channel.

1 Claim 2 (currently amended): The computer program product according to Claim 1, wherein the

2 computer-readable program code means for transmitting client-initiated TCP requests further  
3 comprises:

4 computer-readable program code means for receiving a client-initiated TCP request from  
5 the client at the first component on the first TCP connection;

6 computer-readable program code means for packaging the received client-initiated TCP  
7 request in an HTTP POST request message;

8 computer-readable program code means for sending the HTTP POST request message to  
9 the second component on the ~~network connection~~ send channel;

B3 10 computer-readable program code means for receiving the sent HTTP POST request  
11 message at the second component;

12 computer-readable program code means for extracting the client-initiated TCP request  
13 from the received HTTP POST request message; and

14 computer-readable program code means for forwarding the extracted client-initiated TCP  
15 request to the target server on the second TCP connection.

1 Claim 3 (currently amended): The computer program product according to Claim 2, wherein the  
2 computer-readable program code means for transmitting client-initiated TCP requests further  
3 comprises computer-readable program code means for acknowledging the HTTP POST request  
4 by sending an HTTP POST response from the second component to the first component on the  
5 ~~network connection~~ send channel.

1 Claim 4 (original): The computer program product according to Claim 3, wherein the computer-

2 readable program code means for establishing the send channel operates in response to the  
3 computer-readable program code means for receiving the client-initiated TCP request, and  
4 wherein the computer-readable program code means for transmitting client-initiated TCP requests  
5 further comprises:

6 computer-readable program code means for receiving the HTTP POST response at the  
7 first component; and

8 computer-readable program code means for closing the send channel, responsive to  
9 operation of the computer-readable program code means for receiving the HTTP POST response.

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1 Claim 5 (currently amended): The computer program product according to Claim 1, wherein the  
2 computer-readable program code means for transmitting server-initiated TCP requests further  
3 comprises:

4 computer-readable program code means for sending an HTTP GET request message from  
5 the first component to the second component on the network connection receive channel;

6 computer-readable program code means for receiving the sent HTTP GET request  
7 message at the second component;

8 computer-readable program code means for receiving a server-initiated TCP request from  
9 the target server at the second component on the second TCP connection;

10 computer-readable program code means for packaging the received server-initiated TCP  
11 request in an HTTP GET response message which acknowledges the received HTTP GET  
12 request message;

13 computer-readable program code means for sending the HTTP GET response message

14 from the second component to the first component on the ~~network connection~~ receive channel;  
15 computer-readable program code means for receiving the sent HTTP GET response  
16 message at the first component;  
17 computer-readable program code means for extracting the server-initiated TCP request  
18 from the received HTTP GET response message; and  
19 computer-readable program code means for forwarding the extracted server-initiated TCP  
20 request to the client on the first TCP connection.

B3  
1 Claim 6 (original): The computer program product according to Claim 5, wherein the computer-  
2 readable program code means for transmitting server-initiated TCP requests further comprises:  
3 computer-readable program code means for performing a read operation on the second  
4 TCP connection, responsive to operation of the computer-readable program code means for  
5 receiving the sent HTTP GET request message and prior to operation of the computer-readable  
6 program code means for receiving the server-initiated TCP request; and  
7 computer-readable program code means for using the received server-initiated TCP  
8 request as a result of the read operation, thereby triggering operation of the computer-readable  
9 program code means for packaging the received server-initiated TCP request in the HTTP GET  
10 response message.

1 Claim 7 (original): The computer program product according to Claim 5, wherein the computer-  
2 readable program code means for transmitting server-initiated TCP requests further comprises  
3 computer-readable program code means for preparing to receive another server-initiated TCP

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request by triggering operation of the computer-readable program code means for sending the HTTP GET request message from the first component to the second component, responsive to operation of the computer-readable program code means for receiving the sent HTTP GET response message at the first component.

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Claim 8 (original): The computer program product according to Claim 2, wherein a Multi-Purpose Internet Mail Extensions (MIME) type of the HTTP POST request message is set to "binary/tcp".

Claim 9 (original): The computer program product according to Claim 5, wherein a Multi-Purpose Internet Mail Extensions (MIME) type of the HTTP GET request message is set to "binary/tcp".

Claim 10 (currently amended): A system for sending Transmission Control Protocol (TCP) messages through HyperText Transfer Protocol (HTTP) systems, comprising:

means for establishing a send channel from a first component on a client side of a network connection, through one or more HTTP-based systems, to a second component on a remote side of the network connection;

means for establishing a receive channel from the first component, through the one or more HTTP-based systems, to the second component, wherein the receive channel is distinct from the send channel;

means for establishing a first TCP connection from a client on the client side to the first

10 component;

11 means for establishing a second TCP connection from the second component to a target  
12 server on the remote side;

13 means for transmitting client-initiated TCP requests from the client to the target server by  
14 packaging the client-initiated requests into HTTP messages which are transmitted on the send  
15 channel; and

16 means for transmitting server-initiated TCP requests from the target server to the client by  
17 packaging the server-initiated requests into HTTP messages which are transmitted on the receive  
18 channel.

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1 Claim 11 (currently amended): The system according to Claim 10, wherein the means for  
2 transmitting client-initiated TCP requests further comprises:

3 means for receiving a client-initiated TCP request from the client at the first component on  
4 the first TCP connection;

5 means for packaging the received client-initiated TCP request in an HTTP POST request  
6 message;

7 means for sending the HTTP POST request message to the second component on the  
8 ~~network-connection~~ send channel;

9 means for receiving the sent HTTP POST request message at the second component;

10 means for extracting the client-initiated TCP request from the received HTTP POST  
11 request message; and

12 means for forwarding the extracted client-initiated TCP request to the target server on the

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13 second TCP connection.

1 Claim 12 (currently amended): The system according to Claim 11, wherein the means for  
2 transmitting client-initiated TCP requests further comprises means for acknowledging the HTTP  
3 POST request by sending an HTTP POST response from the second component to the first  
4 component on the ~~network connection~~ send channel.

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1 Claim 13 (original): The system according to Claim 12, wherein the means for establishing the  
2 send channel operates in response to the means for receiving the client-initiated TCP request, and  
3 wherein the means for transmitting client-initiated TCP requests further comprises:  
4 means for receiving the HTTP POST response at the first component; and  
5 means for closing the send channel, responsive to operation of the means for receiving the  
6 HTTP POST response.

1 Claim 14 (currently amended): The system according to Claim 10, wherein the means for  
2 transmitting server-initiated TCP requests further comprises:  
3 means for sending an HTTP GET request message from the first component to the second  
4 component on the ~~network connection~~ receive channel;  
5 means for receiving the sent HTTP GET request message at the second component;  
6 means for receiving a server-initiated TCP request from the target server at the second  
7 component on the second TCP connection;  
8 means for packaging the received server-initiated TCP request in an HTTP GET response

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9 message which acknowledges the received HTTP GET request message;

10 means for sending the HTTP GET response message from the second component to the  
11 first component on the ~~network connection~~ receive channel;

12 means for receiving the sent HTTP GET response message at the first component;

13 means for extracting the server-initiated TCP request from the received HTTP GET  
14 response message; and

15 means for forwarding the extracted server-initiated TCP request to the client on the first  
16 TCP connection.

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1 Claim 15 (original): The system according to Claim 14, wherein the means for transmitting  
2 server-initiated TCP requests further comprises:

3 means for performing a read operation on the second TCP connection, responsive to  
4 operation of the means for receiving the sent HTTP GET request message and prior to operation  
5 of the means for receiving the server-initiated TCP request; and

6 means for using the received server-initiated TCP request as a result of the read operation,  
7 thereby triggering operation of the means for packaging the received server-initiated TCP request  
8 in the HTTP GET response message.

1 Claim 16 (original): The system according to Claim 14, wherein the means for transmitting  
2 server-initiated TCP requests further comprises means for preparing to receive another server-  
3 initiated TCP request by triggering operation of the means for sending the HTTP GET request  
4 message from the first component to the second component, responsive to operation of the means

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5 for receiving the sent HTTP GET response message at the first component.

1 Claim 17 (original): The system according to Claim 11, wherein a Multi-Purpose Internet Mail  
2 Extensions (MIME) type of the HTTP POST request message is set to "binary/tcp".

1 Claim 18 (original): The system according to Claim 14, wherein a Multi-Purpose Internet Mail  
2 Extensions (MIME) type of the HTTP GET request message is set to "binary/tcp".

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1 Claim 19 (currently amended): A method for sending Transmission Control Protocol (TCP)  
2 messages through HyperText Transfer Protocol (HTTP) systems, comprising the steps of:  
3 establishing a send channel from a first component on a client side of a network  
4 connection, through one or more HTTP-based systems, to a second component on a remote side  
5 of the network connection;  
6 establishing a receive channel from the first component, through the one or more HTTP-  
7 based systems, to the second component, wherein the receive channel is distinct from the send  
8 channel;  
9 establishing a first TCP connection from a client on the client side to the first component;  
10 establishing a second TCP connection from the second component to a target server on  
11 the remote side;  
12 transmitting client-initiated TCP requests from the client to the target server by packaging  
13 the client-initiated requests into HTTP messages which are transmitted on the send channel; and  
14 transmitting server-initiated TCP requests from the target server to the client by packaging

15 the server-initiated requests into HTTP messages which are transmitted on the receive channel.

1 Claim 20 (currently amended): The method according to Claim 19, wherein the step of

2 transmitting client-initiated TCP requests further comprises the steps of:

3 receiving a client-initiated TCP request from the client at the first component on the first  
4 TCP connection;

5 packaging the received client-initiated TCP request in an HTTP POST request message;

6 sending the HTTP POST request message to the second component on the network  
7 connection send channel;

8 receiving the sent HTTP POST request message at the second component;

9 extracting the client-initiated TCP request from the received HTTP POST request  
10 message; and

11 forwarding the extracted client-initiated TCP request to the target server on the second  
12 TCP connection.

1 Claim 21 (currently amended): The method according to Claim 20, wherein the step of

2 transmitting client-initiated TCP requests further comprises the step of acknowledging the HTTP  
3 POST request by sending an HTTP POST response from the second component to the first  
4 component on the network connection send channel.

1 Claim 22 (original): The method according to Claim 21, wherein the step of establishing the send  
2 channel operates in response to the step of receiving the client-initiated TCP request, and wherein

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3 the step of transmitting client-initiated TCP requests further comprises the steps of:

4 receiving the HTTP POST response at the first component; and

5 closing the send channel, responsive to receiving the HTTP POST response.

1 Claim 23 (currently amended): The method according to Claim 19, wherein the step of

2 transmitting server-initiated TCP requests further comprises the steps of:

3 sending an HTTP GET request message from the first component to the second

4 component on the ~~network connection~~ receive channel;

5 receiving the sent HTTP GET request message at the second component;

6 receiving a server-initiated TCP request from the target server at the second component

7 on the second TCP connection;

8 packaging the received server-initiated TCP request in an HTTP GET response message

9 which acknowledges the received HTTP GET request message;

10 sending the HTTP GET response message from the second component to the first

11 component on the ~~network connection~~ receive channel;

12 receiving the sent HTTP GET response message at the first component;

13 extracting the server-initiated TCP request from the received HTTP GET response

14 message; and

15 forwarding the extracted server-initiated TCP request to the client on the first TCP

16 connection.

1 Claim 24 (original): The method according to Claim 23, wherein the step of transmitting server-

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initiated TCP requests further comprises the steps of:

performing a read operation on the second TCP connection, responsive to receiving the sent HTTP GET request message and prior to receiving the server-initiated TCP request; and using the received server-initiated TCP request as a result of the read operation, thereby triggering the step of packaging the received server-initiated TCP request in the HTTP GET response message.

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Claim 25 (original): The method according to Claim 23, wherein the step of transmitting server-initiated TCP requests further comprises the step of preparing to receive another server-initiated TCP request by triggering the step of sending the HTTP GET request message from the first component to the second component, responsive to receiving the sent HTTP GET response message at the first component.

Claim 26 (original): The method according to Claim 20, wherein a Multi-Purpose Internet Mail Extensions (MIME) type of the HTTP POST request message is set to "binary/tcp".

Claim 27 (original): The method according to Claim 23, wherein a Multi-Purpose Internet Mail Extensions (MIME) type of the HTTP GET request message is set to "binary/tcp".

Claim 28 (currently amended): A method for transporting bi-directional protocol traffic through uni-directional protocol systems, comprising the steps of:  
establishing a send channel from a first component on a client side of a network

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4 connection, through one or more uni-directional protocol-based systems, to a second component  
5 on a remote side of the network connection;

6 establishing a receive channel from the first component, through the one or more uni-  
7 directional protocol-based systems, to the second component, wherein the receive channel is  
8 distinct from the send channel;

9 establishing a first bi-directional protocol connection from a client on the client side to the  
10 first component;

11 establishing a second bi-directional protocol connection from the second component to a  
12 target server on the remote side;

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13 transmitting client-initiated bi-directional protocol requests from the client to the target  
14 server by packaging the client-initiated bi-directional protocol requests into uni-directional  
15 protocol messages which are transmitted on the send channel; and

16 transmitting server-initiated bi-directional protocol requests from the target server to the  
17 client by packaging the server-initiated bi-directional protocol requests into uni-directional  
18 protocol messages which are transmitted on the receive channel.

1 Claim 29 (currently amended): The method according to Claim 28, wherein the step of  
2 transmitting client-initiated bi-directional protocol requests further comprises the steps of:

3 receiving a client-initiated bi-directional protocol request from the client at the first  
4 component on the first bi-directional protocol connection;

5 packaging the received client-initiated bi-directional protocol request in a uni-directional  
6 protocol write request message;

7 sending the uni-directional protocol write request message to the second component on  
8 the ~~network connection~~ send channel;

9 receiving the sent uni-directional protocol write request message at the second  
10 component;

11 extracting the client-initiated bi-directional protocol request from the received uni-  
12 directional protocol write request message; and

13 forwarding the extracted client-initiated bi-directional protocol request to the target server  
14 on the second bi-directional protocol connection.

3  
1 Claim 30 (currently amended): The method according to Claim 28, wherein the step of  
2 transmitting server-initiated bi-directional protocol requests further comprises the steps of:

3 sending a uni-directional protocol read request message from the first component to the  
4 second component on the ~~network connection~~ receive channel;

5 receiving the sent uni-directional protocol read request message at the second component;

6 receiving a server-initiated bi-directional protocol request from the target server at the  
7 second component on the second bi-directional protocol connection;

8 packaging the received server-initiated bi-directional protocol request in a uni-directional  
9 protocol read response message which acknowledges the received uni-directional protocol read  
10 request message;

11 sending the uni-directional protocol read response message from the second component to  
12 the first component on the ~~network connection~~ receive channel;

13 receiving the sent uni-directional protocol read response message at the first component;

14 extracting the server-initiated bi-directional protocol request from the received uni-  
15 directional protocol read response message; and  
16 forwarding the extracted server-initiated bi-directional protocol request to the client on the  
17 first bi-directional protocol connection.

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